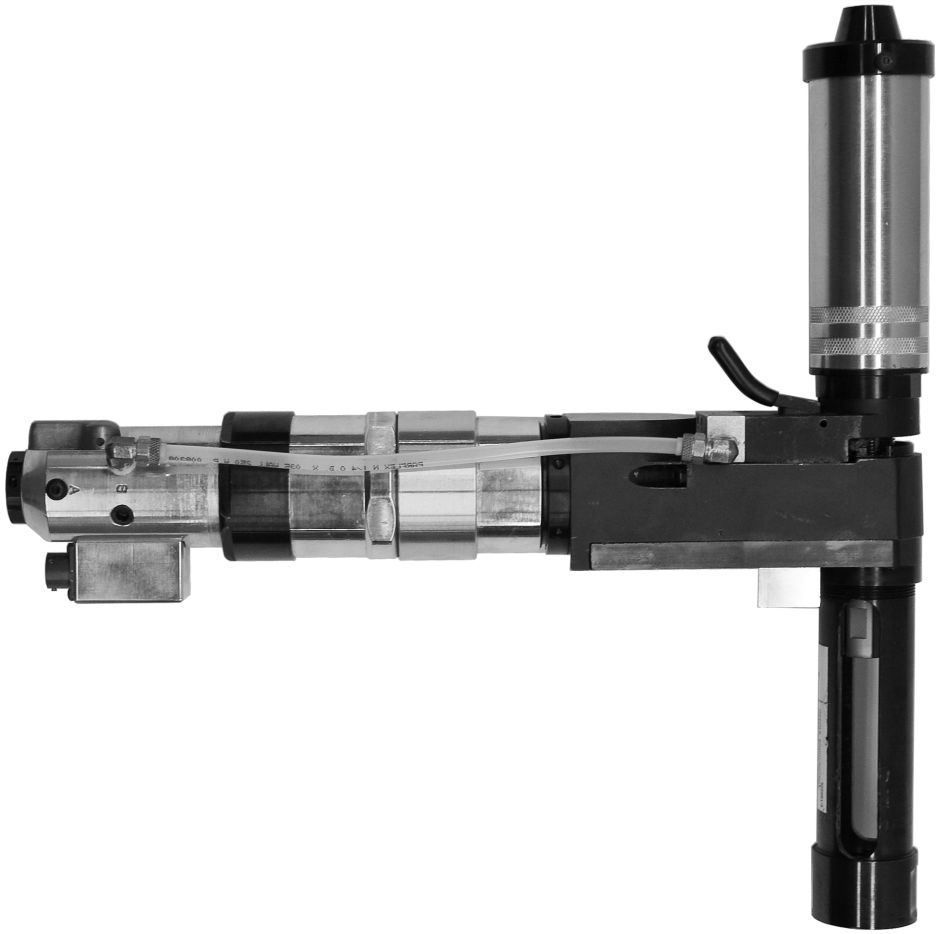
Service Manual
PL92-5000EN
03/10/2010



QUACKENBUSH™ 158QRA & 158/15QRA Series

Adaptive Positive Feed Drill

COOPER Tools

For additional product information visit our website at
http://www.cooperpowertools.com

XXX	Q	R	A	-	XXX	-	XX	-	9.50	X	X	-	X	XXX	-	XXX

Tool Series
- **158 =** Positive Feed
- **158/15 =** Positive Feed

Brand
- **Q =** Quackenbush

Tool Style
- **R =** Right Angle

Revision
- **A =** Adaptive Drill

RPM (Spindle Speed)
Select Desired Speed
- 900 / 300 (158 series)
- **12/4 =** 1200 / 400 (158/15 series)

Feed Rate
Select desired feed rate
- **10 =** .001 IPR
- **20 =** .002 IPR

Spindle Length
- **A =** Length (Specify 0.00) (Stroke+Non-Thread+Gear Head)
- **F =** No Spindle

Spindle Interface Thread to Cutter
- **A =** 1/4-28
- **B =** 5/16-18
- **C =** 3/8-24
- **D =** 9/16-18
- **E =** Other (specify)

Nose Attachment Thread
- **A =** 2 1/4-20 (158 series)
- **B =** 1 9/16-20 (158 series)
- **C =** 1.0"-20 (158/15 series)

Options
- **2 =** Concentric Collet
- **4 =** Indexer
- **5 =** None

Accessories
- **A =** Nose
- **B =** Spindle
- **C =** Chuck
- **D =** Fluid Chuck
- **E =** Fluid Inducer
- **F =** None

Last three digits of material number

General Safety Instructions:

These safety instructions must be accessible to the operator at all times. They must be shown and made available to all personnel involved in the use of this equipment.

These safety instructions are not intended to be all inclusive. Study and comply with all applicable Federal, State and Local Regulations. If necessary, contact your local Cooper Tools' representative for assistance.

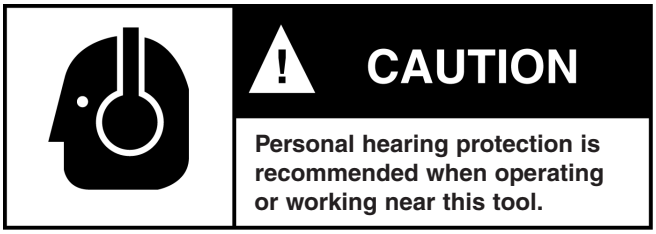
Always disconnect the tool from the air supply before adjusting or repairing.

Immediaely shut off the tool in the case of unusual sound or vibration. Have a qualified person check the tool and repair before using.

Do not modify the tool, any guard or accessory unless approved in writing by Cooper Tools.

Implement and follow a Safety Maintenence Program to provide inspection and maintenance of all phases of tool operation and air supply equipment.

Eye Protection:



Hearing Protection:

Hearing protection is recommended in high noise areas, 85 dBA or greater. The operation of other tools and equipment in the area, reflective surfaces, process noises and resonant structures can substantially contribute to and increase the noise level in the area.

General Protection:

Follow good machine shop practices. Rotating shafts and moving components can entangle or entrap and may result in serious personal injuries. Never wear long hair, loose fitting clothes, gloves, ties or jewelry when working with or near a drill of any type.

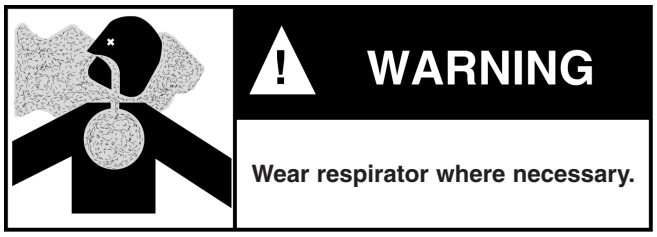
WARNING

The spindle on right angle positive feed drills retracts at a much faster rate than it feeds. Care must be taken to avoid entrapment.

Nosepieces usually used with these drills are generally slotted for visibility and access to chuck, cutter, and retract stop adjustments. A spindle guard should be used when operating the tool.

Spindle guards in one inch increments are available to accommodate any length spindle. Slotted spindle guards are available for tools with fluid swivels.

Respirator:



Drilling or other use of this tool may produce hazardous fumes and/or dust. To avoid adverse health effects utilize adequate ventiliation and wear a respirator if necessary. Read the Material Safety Data Sheet (MSDS) for any cutting fluids or materials involved in the drilling process.

⚠ WARNING

- Most dusts are combustable. See Material Safety Data Sheets for combustibility of a specific dust.
- Non ferrous metal dusts are particularly hazardous. Examples: Aluminum, Magnesium, Titanium (Never collect Magnesium in a dry dust collector.)
- Never collect spark generating material in the same dust collector with combustible material. Examples: Steel and Aluminum dust or Steel and Titanium dust
- Never use flamable finishing lubricants.

Tool Operation:

This tool is designed to drill holes in different material stacks and is for use only with the Quackenbush DMP control box and should not be connected directly to a standard air line.

Refer to PL92-DMP for operation and use of the DMP control box, these instructions must be read and understood before initiating any drilling operation.

The operating parameters for the tool are programmed using the adaptive interface kit and DMP-TMS programming software, refer to literature PL92-DMP-PROG for details on programming the tool memory, these instructions must be read and understood before initiating any drilling operation.

The power unit is started by turning the throttle valve lever.

158 Gear Head: The feed mechanism is engaged by depressing the feed cam knob while the tool is running.

158-15 Gear Head: The feed mechanism is engaged by pushing the feed/retract lever (622973) down.

The spindle will automatically retract when the stop collar depresses the retract lever. The spindle may be manually retracted at any stage by pulling up on the retract lever. The tool must be shut off when the spindle is completely retracted.

158-15 Gear Head: The Gear Stop (622985) can be adjusted by turning the two 1/8” hex set screws (867502) on either side of the angle head.

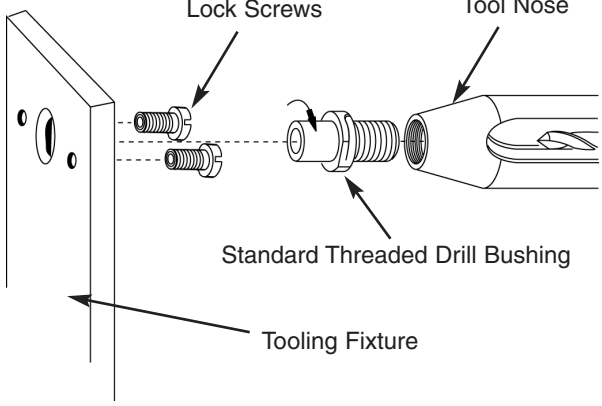
⚠ CAUTION

Always disconnect the tool from it’s air supply before installing or removing a cutter and other accessories or performing any maintenance.

Before mounting any positive feed drill, check the lock screws in the tooling fixture and drill bushing. Make sure both are in good condition and securely tightened.

Positive feed drills can exert high torques and high thrust loads. If failure of the lock screws or drill bushing occurs, the drill may suddenly spin and back away from the drill fixture.

Figure 1



Warning Labels:

The warning labels on these tools are essential parts of the product and are not to be removed. Check labels regularly and replace any that are not clearly legible. The Nosepiece safety label number is 202691.

Storage:

If it is necessary to store this tool for an extended period of time (overnight, weekend, etc.), it should receive a generous amount of lubricant at that time and again when returned to service. Always store the tool in a clean dry environment.

General Instructions:

Torque Specifications for Fasteners:

Basic engineering practice should be used when assembling threaded components. Tightening torque values are shown on the exploded views as a guide for disassembly and re-assembly. The “Hand” image indicates “Hand Tighten”.

Disassembly:

Remove all external tubing from the unit. Secure the tool in a smooth jawed vise by clamping lightly on the motor housing flats. Loosen the lock ring and unthread the drill head assembly (RH thread) from the power unit.

158-15 Series: The drill head assembly utilizes a motor adapter for assembly to the power unit.

Gearing:

Refer to Illustration “C”.

Disassembly:

Remove the lock ring from the internal gear. Using a suitable wrench, unthread the internal gear (RH thread) from the motor housing. The planet cage assembly can now be removed from the internal gear and the component parts disassembled.

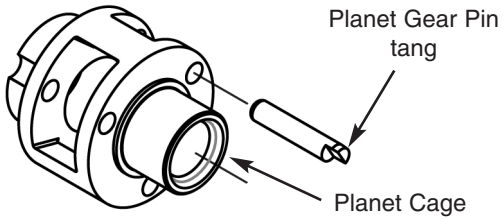
158 Series: Unthread the bevel gear (RH thread) from the planet cage to permit disassembly of the front planet cage ball bearing and washer.

Assembly:

Apply a generous amount of No. 2 Moly grease to all gearing components during assembly.

Assembly Note: Assemble the tang end of the planet gear pins toward the front of the planet cage so the planet cage washer will lock them in position, Figure 2.

Figure 2



Motor Module:

Refer to Illustrations “A” & “B”.

Disassembly:

To remove the motor assembly from the motor housing invert the tool in the vise. Unthread the handle nut (RH thread) and remove the handle assembly from the motor housing. The complete motor assembly can now be removed through the rear of the motor housing.

Unthread the magnet rotor (LH thread) from the motor shaft to permit disassembly of the rear bearing plate and bearing.

Using a soft mallet, tap the motor shaft out of the front ball bearing. This will allow the disassembly of the front bearing plate, cylinder, rotor blades and rotor.

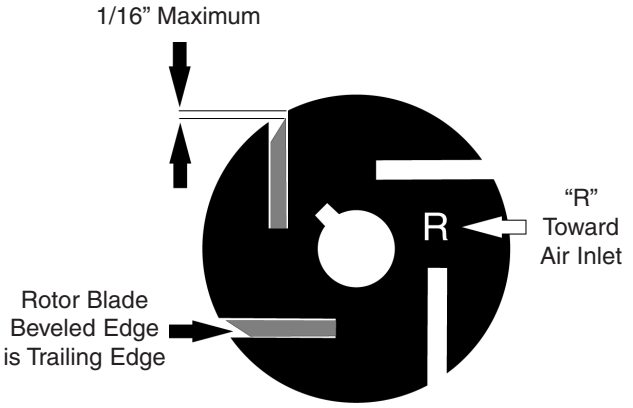
To remove the ball bearing from the front bearing plate, unthread the bearing retainer (LH thread) from the front bearing plate.

Assembly:

The rotor blades should be replaced during each maintenance cycle or if they are worn 1/16” below the rotor surface, Figure 3.

Assembly Note: The beveled edge of the blade is the trailing edge. The rotor and cylinder have an “R” etched on one end. The “R” should be facing the rear to insure clockwise rotation, Figure 3.

Figure 3



158 Drill Head:

Refer to Illustrations “D” & “E”.

Disassembly:

Remove the stop body assembly (4 screws) from the drill head housing.

Loosen the two set screws in the side of the housing and remove the gear stop.

Remove the cylinder assembly (3 screws) from the drill head housing.

Remove the housing cover (3 screws) from the drill head housing. The gearing components can now be disassembled as shown in Illustration “E”.

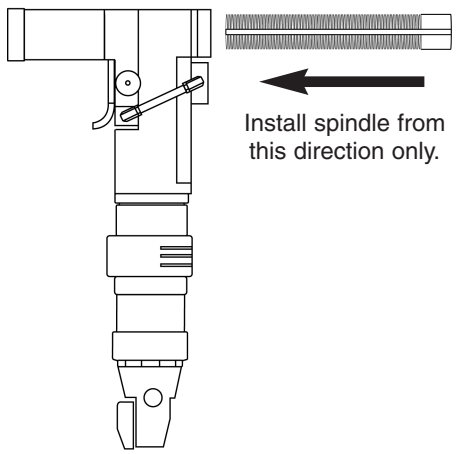
Assembly:

Assemble the drill head in reverse order of disassembly. Clean and inspect all parts for excessive wear or damage and replace as necessary with Quackenbush replacement parts.

Apply a generous amount of Acculube grease to all gears and bearings during assembly.

Assembly Note: Always install the spindle from the drive gear side of the drill head housing, Figure 4.

Figure 4



The 158 series drill head does not require shims to set the bevel gears. Correct engagement of the bevel gears is obtained by running the power unit at a very slow speed and threading it into the drill head until gear interference is felt. Back off the power unit approximately 1/8" turn or until there is no gear interference then tighten the lock nut. This procedure will attain maximum gear engagement.

After the tool is assembled, place a few drops of 10W machine oil in the air inlet befoe attaching the air supply. This will insure immediate lubrication of all parts as soon as air is applied.

Gear Stop Adjustment:

There are two methods that can be used to adjust the gear stop. The preferred method is to make the adjustment during assembly of the drill before the retract body and it's related components are attached to the drill head, see Method 1.

Method 1 (during assembly): Place the gear stop in position with the two clutch rollers located on top of the cam lobes, rather than in the detents. Turn the two set screws, in the side of the housing, clockwise until the springs begin to make up solid but are not crushed or distorted. Now rotate the two set screws counter-clockwise 90-180 degrees. With this method, it is easier to determine when the spring makes up solid so there is less tendency to force the screw in to deep causing damage to the spring.

Method 2 (fully assembled unit): The clutch rollers are normally sitting in the detents. Turn the two set screws, in the side of the housing, clockwise until the springs just begin to go solid. Care must be taken not to distort the springs. Once the solid state is achieved, rotate the set screws counter-clockwise 2-1/4 full turns plus 90-180 degrees. ***Important: Too much tension can result in gear damage.***

158-15 Drill Head:

Refer to Illustrations "F" & "G".

Disassembly:

Unthread the motor adapter (LH thread) from the drill head housing. Remove the hex drive adapter, drive coupling, spacer, bearing, and bevel gear from the drill head housing.

Remove the retract body assembly (4 screws) from the drill head housing.

If used, unthread the upper jam nut (LH thread) from the spindle. Loosen the set screw in the side of the upper stop collar and unthread the stop collar (LH thread) from the spindle.

Unthread the nose adpater (LH thread) from the drill head housing. The spindle assembly can now be removed from the drill head housing.

Remove the cover (2 screws) from the drill head housing. The gearing components can now be disassembled as shown in Illustration "G".

Assembly:

Assemble the drill head in reverse order of disassembly. Clean and inspect all parts for excessive wear or damage and replace as necessary with Quackenbush replacement parts.

Apply a generous amount of Acculube grease to all gears and bearings during assembly.

Assembly Note: When installing the 617168 ball bearing, make sure the ball loading notches are facing the drill head housing.

Assembly Note: Always install the spindle from the drive gear side of the drill head housing, Figure 4.

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Handle & Sensor Assemblies

"A"

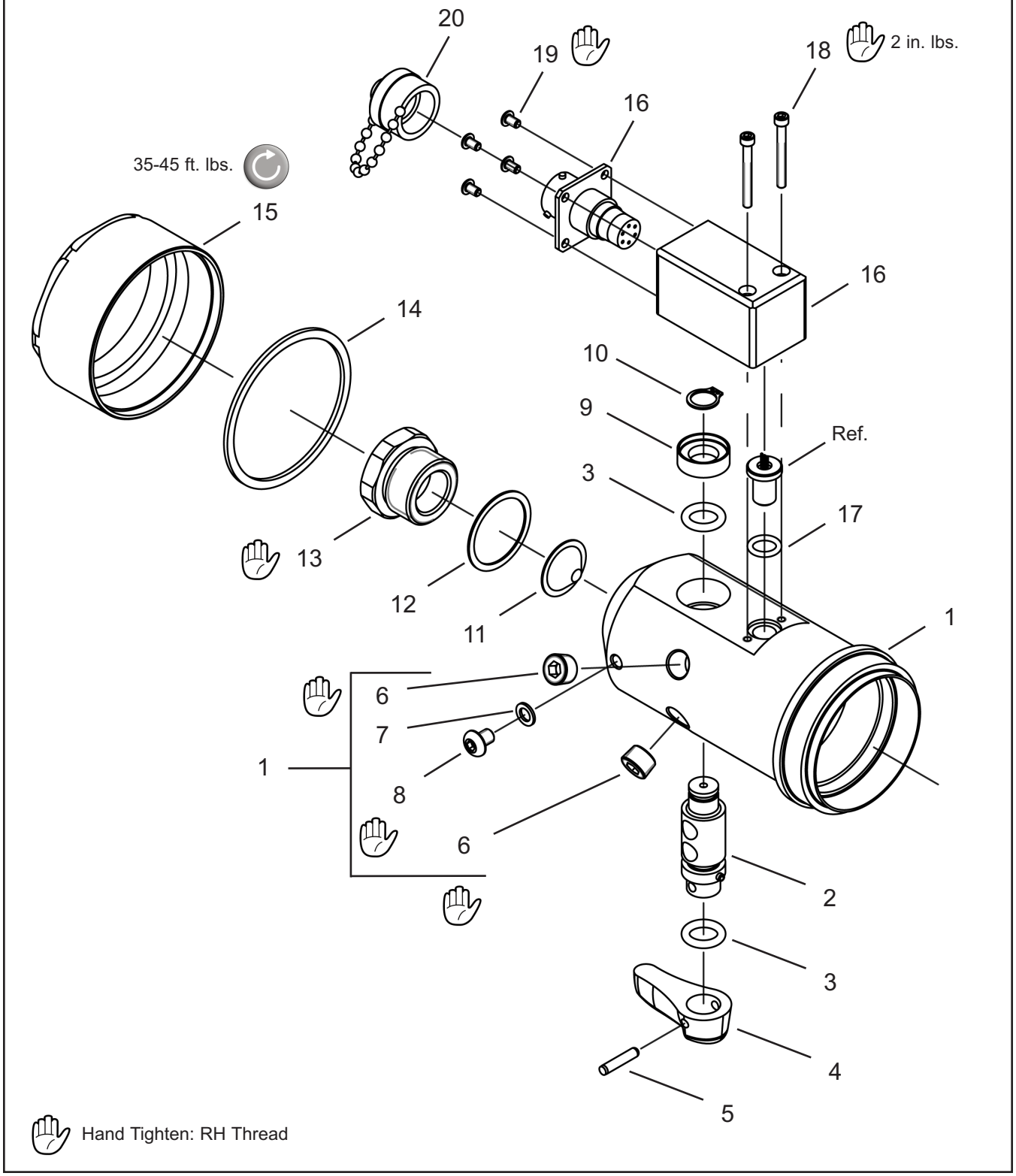

Illustration "A" - Handle Assembly

Ref	Number	#	X	EN Description
--	642014PT	1		Handle Assembly (includes Ref. 1 - 15)
1	642015PT	1		Throttle Handle
2	613254	1		Valve Assembly
3	1466	2	6	O-Ring
4	613697	1	1	Trigger
5	844111	1	2	Dowel Pin
6	843434	2	2	Pressure Plug
7	624121	1	3	Gasket
8	812962	1	3	Screw (10-32 UNF)
9	613253	1		Washer
10	812231	1	3	Retaining Ring
11	843656	1	3	Air Screen
12	1853	1	1	Shim
13	613102	1		Hose Adapter
14	613282	1		Clamp Ring
15	613283	1		Handle Nut
16	642013PT	1		Sensor Assembly (includes Ref. 16 - 20)
17	504970	1	3	O-Ring
18	622332	2	2	Screw (4-40 UNC)
19	202932	4	4	Screw (4-40 UNC)
20	633753PT	1		Protection Cap

(#) Quantity
(X) Recommended Spare Parts

Quackenbush®

Motor Module

"B" 642011PT Motor Module

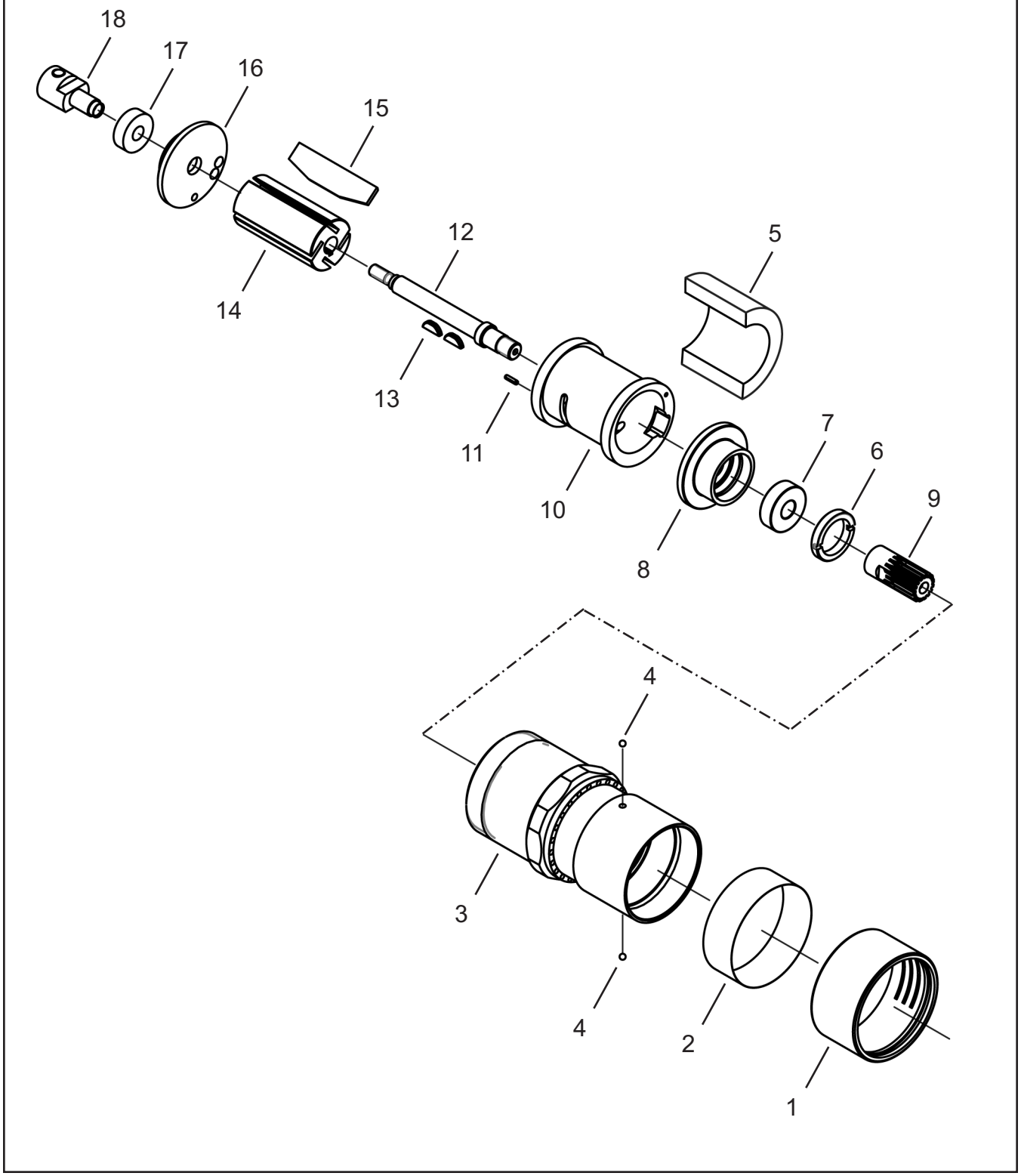

Illustration "B" - Motor Module

Ref	Number	#	X	EN Description
--	641660	1		Motor Housing Assembly (includes Ref. 1 - 5)
1	615391	1		Exhaust Deflector
2	615467	1	2	Wire Screen
3	613275	1		Motor Housing
4	844265	2	6	Ball (.125")
5	633608PT	1	2	Muffler
--	641662	1		Motor Assembly (includes Ref. 6 - 17)
6	613294	1		Bearing Retainer
7	613248	1	2	Front Ball Bearing
8	613273	1		Front Bearing Plate
9	617609	1	1	Pinion Gear
10	613225	1		Cylinder
11	613162	1	2	Pin
12	617608	1		Motor Shaft
13	863365	2	4	Woodruff Key
14	613234	1		Rotor
15	613236	4	8	Rotor Blade
16	613241	1		Rear Bearing Plate
17	847511	1	2	Rear Ball Bearing
18	633728PT	1	1	Magnet Rotor

(#) Quantity
(X) Recommended Spare Parts

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Gearing Assembly

"C" 621251 Gearing Assembly

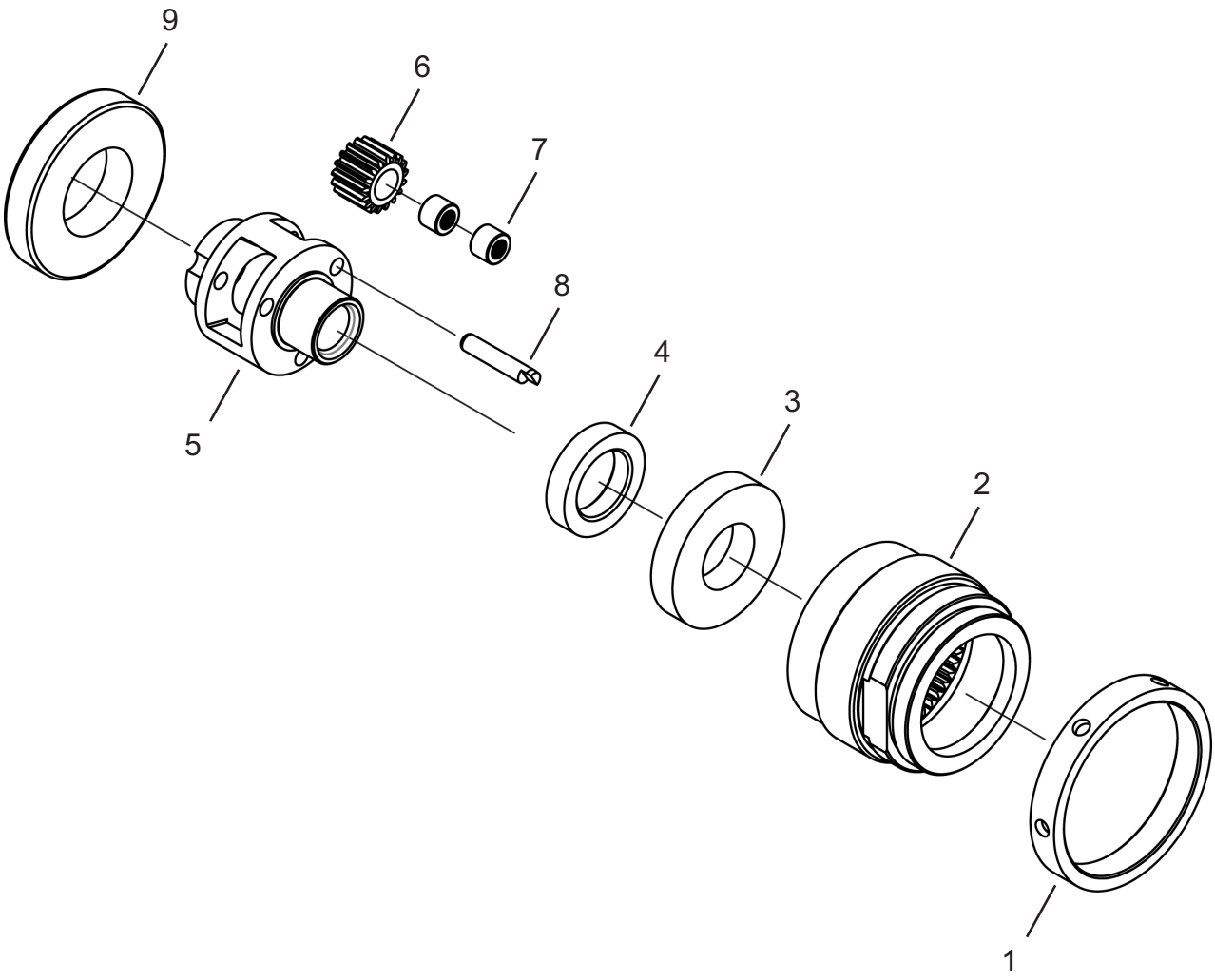

Illustration "C" - Gearing Assembly

Ref	Number	#	X	EN Description
1	619421	1		Lock Nut
2	613285	1		Internal Gear
3	864471	1	2	Ball Bearing
4	617370	1		Planet Cage Washer
5	612050	1		Planet Cage
6	617305	3	6	Planet Gear
7	613271	6	12	Needle Bearing
8	613279	3	6	Planet Pin
9	613281	1	2	Ball Bearing

(#) Quantity
(X) Recommended Spare Parts

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158 Right Angle Drill Head - Housing

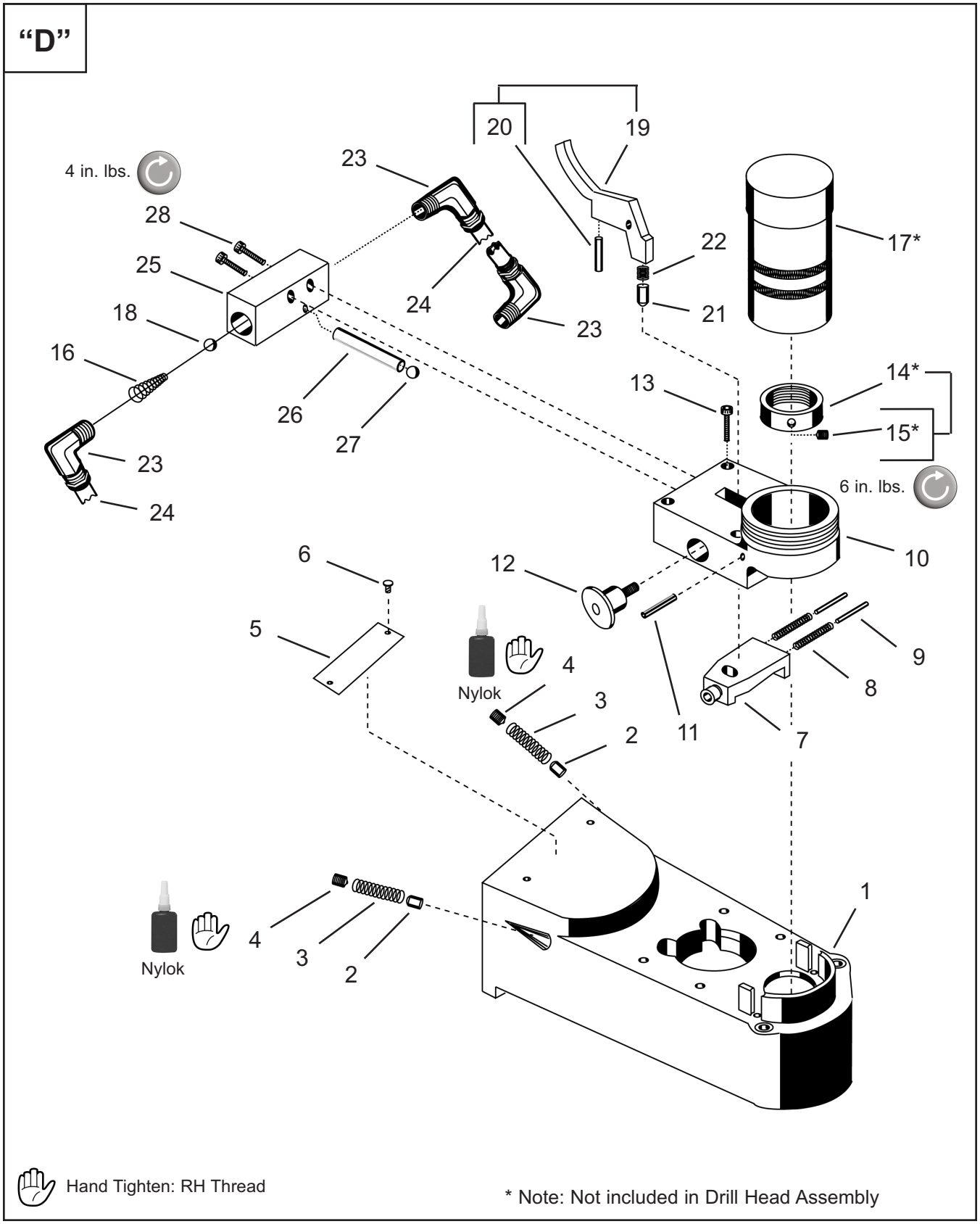


Illustration "D" - Right Angle Drill Head - Housing (158 series)

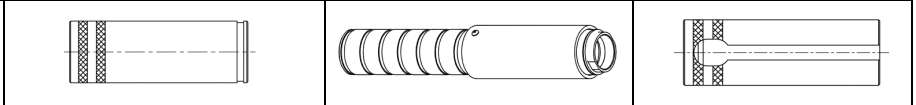
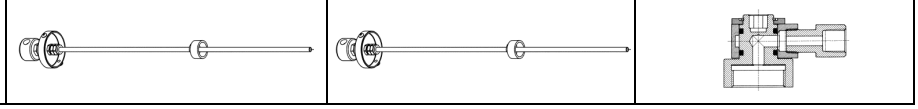
Ref	Number	#	X	EN Description
--	Table "D"	1		Drill Head Assembly
1	624622	1		Housing
2	624615	2	4	Clutch Plunger
3	624916	2	6	Clutch Adjustment Spring
4	202583	2	4	Set Screw (5/16-18 UNC)
5	613828	1		Nameplate
6	834228	2		Drive Screw
7	617246	1		Cam
8	617257	2	6	Cam Spring
9	843280	2	4	Dowel Pin (Cam)
10	624106	1		Stop Body
11	864287	1	2	Dowel Pin (Trigger)
12	617249	1		Knob
13	617245	4	4	Screw
14	613365	1		Stop Collar
15	617243	1	2	Screw (8-32 UNC)
16	619830	1	3	Spring
17	Table "D1"	1		Spindle Guard and Fluid Inducer
18	842160	1	3	Steel Ball (7/32")
19	617247	1		Trigger
20	884125	1	2	Lever Pin
21	617252	1	2	Trigger Plunger
22	842515	1	3	Reverse Stop Spring
23	882209	3	3	Tubing Elbow
24	882407	2	2	Air Line
25	617395	1		Valve Body
26	833075	1		Push Rod
27	842161	1	3	Steel Ball (3/16")
28	617396	2	2	Screw (6-32 UNC)

(#) Quantity
(X) Recommended Spare Parts

Table "D"

Ref.	Description	#	Part Number	Feed Rate
--	Drill Head Assembly	1	621915	.001
--	Drill Head Assembly	1	621916	.002

Table "D1"

Ref.	Description	#	Solid Guard			Variable Solid Guard			Fluid Guard		
			Number	Length	Fluid Inducer	Number	Length	Fluid Inducer	Number	Length	Fluid Inducer
17	Spindle Guard	1	624360	1"	641947PT	641983-7	7"	641947PT	624375	2"	621448
	Spindle Guard	1	624361	2"		641983-8	8"		624376	3"	
	Spindle Guard	1	624362	3"		641983-9	9"		624322	4"	
	Spindle Guard	1	624103	4"		641983-10	10"		624377	5"	
	Spindle Guard	1	624363	5"		641983-11	11"		624323	6"	
	Spindle Guard	1	624104	6"		641983-12	12"		624376	7"	
	Spindle Guard	1				641983PT	13"				
	Spindle Guard										
	Fluid Inducer										

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158 Right Angle Drill Head - Gearing

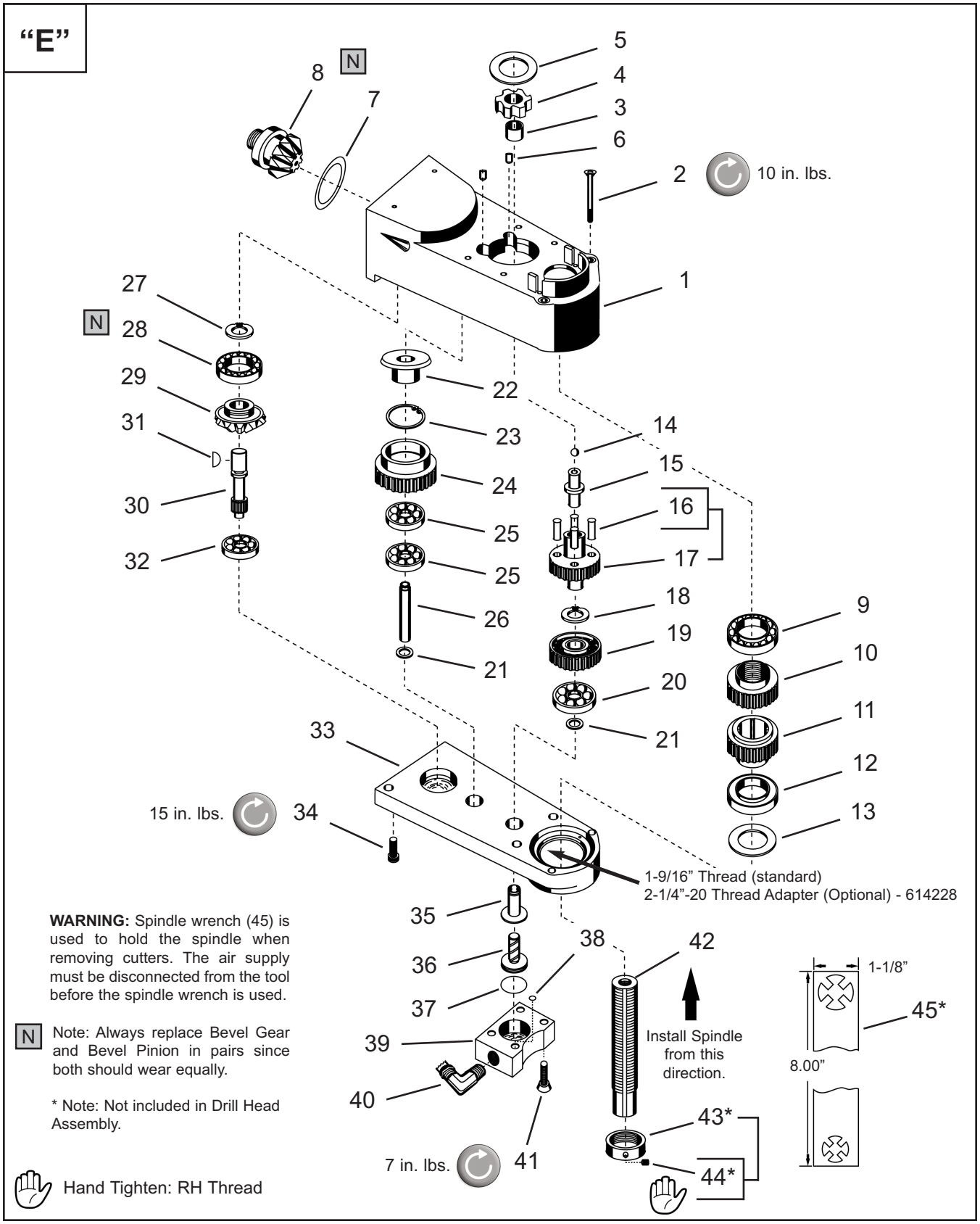

Illustration "E" - Right Angle Drill Head - Gearing (158 series)

Ref	Number	#	X	EN Description
--	Table "E"	1		Drill Head Assembly
1	Illustration "D"	1		Housing
2	624617	2	4	Screw (6-32 UNC)
3	617253	1	2	Needle Bearing
4	624620	1		Gear Stop
5	615433	1		Thrust Race
6	624614	2	4	Clutch Roller
7	614269	AR	AR	Shim (.005")
	614270	AR	AR	Shim (.010")
8	614216	1	1	Bevel Pinion
9	617220	1	2	Ball Bearing
10	Table "E1"	1	1	Spindle Feed Gear
11	617200	1	1	Spindle Drive Gear
12	624635	1	2	Ball Bearing
13	624638	1		Thrust Race
14	842161	1	3	Steel Ball (3/16")
15	617391	1		Cam Follower
16	616479	4		Pin
17	Table "E2"	1	1	Differential Feed Gear
18	617217	1	2	Retaining Ring
19	617198	1	1	Drive Gear
20	619377	1	2	Ball Bearing
21	843390	2		Gear Spacer
22	613687	1		Idler Gear Spacer
23	619017	1	2	Retaining Ring
24	613686	1	1	Idler Gear
25	619019	2	4	Ball Bearing
26	617208	1		Idler Shaft
27	843179	1	2	Retaining Ring
28	864471	1	2	Ball Bearing
29	614217	1	1	Bevel Gear
30	617203	1		Pinion Gear
31	863365	1	3	Woodruff Key
32	847095	1	2	Ball Bearing
33	624636	1		Housing Cover
34	847688	3	6	Screw (10-24 UNC)
35	624619	1		Feed Gear Bushing
36	624616	1		Piston
37	847272	1	3	O-Ring
38	844303	1	3	O-Ring
39	624618	1		Cylinder
40	882209	1	2	Tubing Elbow
41	624651	3	6	Screw (6-32 UNC)
42	Table "E3"	1		Spindle
43	613365	1		Stop Collar
44	617243	1	2	Set Screw (8-32 UNC)
45	622466	1		Spindle Wrench

(#) Quantity
(X) Recommended Spare Parts

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Table "E"

Ref.	Description	#	Part Number	Feed Rate
--	Drill Head Assembly	1	621915	.001
--	Drill Head Assembly	1	621916	.002

Table "E1" - Spindle Feed Gear

Ref.	Description	#	Part Number	Feed per Revolution	Number of Teeth
10	Spindle Feed Gear	1	615893	.001	50
	Spindle Feed Gear	1	615894	.002	44

Table "E2" - Differential Feed Gear

Ref.	Description	#	Part Number	Feed per Revolution	Number of Teeth
17	Differential Feed Gear	1	624643	.001	49
	Differential Feed Gear	1	617356	.002	44

Table "E3" - Spindles

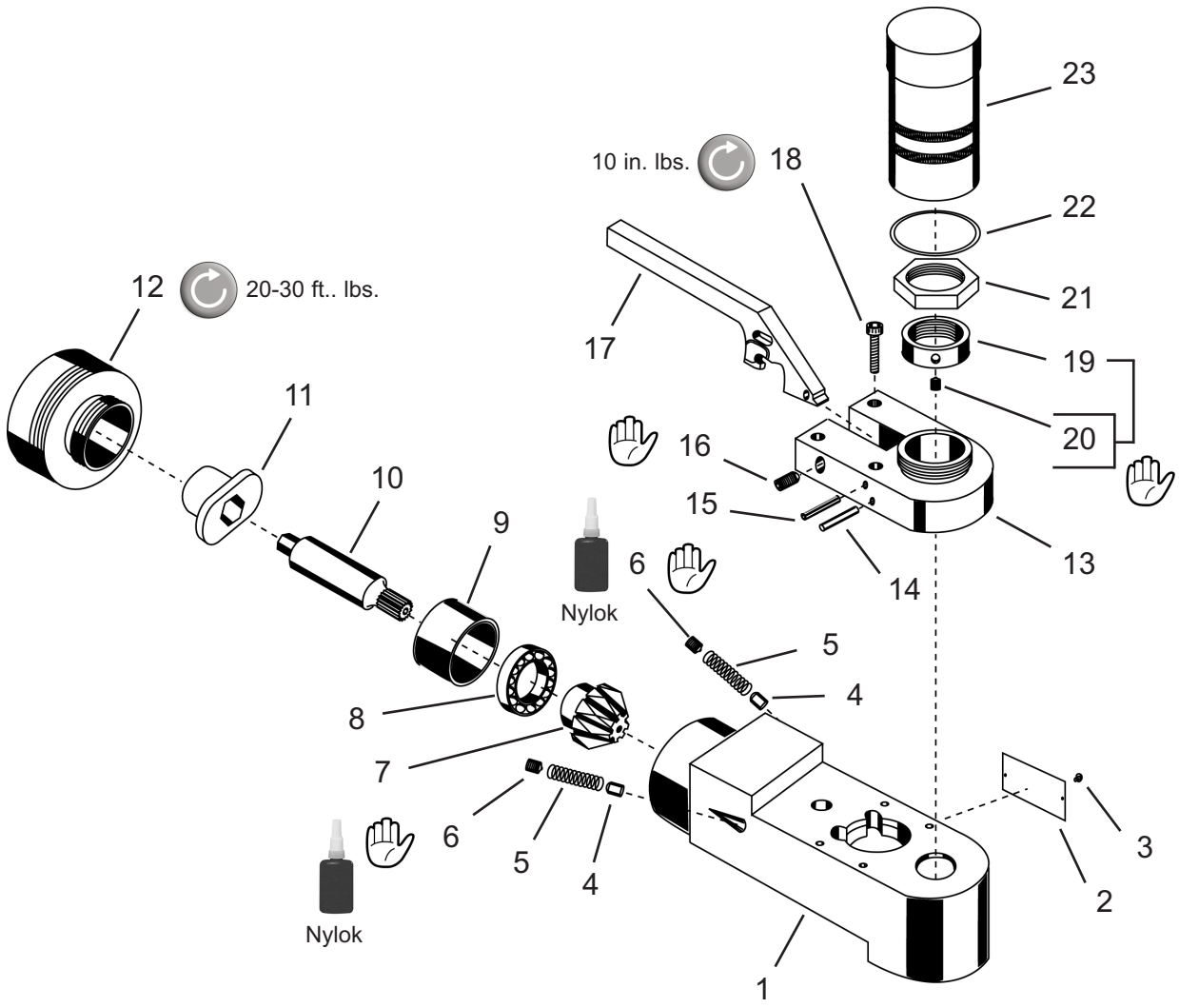
Ref.	Description	#	Part Number	Overall Length	Solid or Fluid	Attachment Thread
42	Spindle	1	615890	7.00"	Fluid	9/16"-18
	Spindle	1	623211	8.50"	Fluid	3/8"-24
	Spindle	1	623955	9.25"	Fluid	9/16"-18
	Spindle	1	623210	10.00"	Fluid	9/16"-18
	Spindle	1	633179	12.00"	Fluid	9/16"-18
	Spindle	1	615982	15.00"	Fluid	5/8"-18

Note: Other spindles avilable on request.

Quackenbush®

158/15 Right Angle Drill Head - Housing

"F"



Hand Tighten: RH Thread

Illustration "F" - Right Angle Drill Head - Housing (158/15 series)

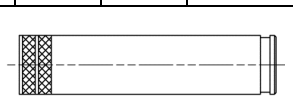
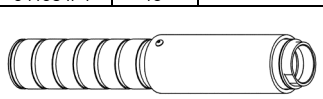
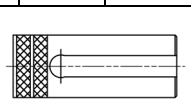
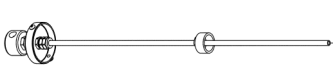
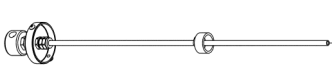
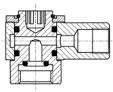
Ref	Number	#	X	EN Description
--	Table "F"	1		Drill Head Assembly
1	622986	1		Housing
2	613828	1		Nameplate
3	834228	2	4	Drive Screw
4	622984	2	6	Clutch Roller
5	619685	2	6	Clutch Adjustment Spring
6	867502	2	6	Set Screw (1/4-20 UNC)
7	Illustration "G"	1		Bevel Gear (Driving)
8	Illustration "G"	1		Ball Bearing
9	617149	1		Spacer
10	622951	1		Drive Coupling
11	625625	1		Hex Drive Adapter
12	625626	1		Motor Adapter
13	624094	1		Retract Body
14	844111	1	2	Lever Pin
15	844787	1	2	Roll Pin
16	622954	1	2	Ball Plunger (5/16-18 UNC)
17	62973	1		Retract Lever
18	863337	4	4	Screw (6-32 UNC)
19	617962	1		Stop Collar
20	617785	1	2	Set Screw (8-32 UNC)
21	629545	1		Jam Nut (Optional)
22	624351	1	2	Spindle Guard Shim (Fluid Spindle Guard only)
23	Table "F1"	1		Spindle Guard and Fluid Inducer
24	624355	1		Spindle Guard Cap

(#) Quantity
(X) Recommended Spare Parts

Table "F"

Ref.	Description	#	Part Number	Feed Rate
--	Drill Head Assembly	1	631778	.001
--	Drill Head Assembly	1	631780	.002

Table "F1"

Ref.	Description	#	Solid Guard			Variable Solid Guard			Fluid Guard		
			Number	Length	Fluid Inducer	Number	Length	Fluid Inducer	Number	Length	Fluid Inducer
23	Spindle Guard	1	624339	1"	641948PT	641984-7	7"	641948PT	624328	2"	631256
	Spindle Guard	1	624340	2"		641984-8	8"		624329	3"	
	Spindle Guard	1	624341	3"		641984-9	9"		624330	4"	
	Spindle Guard	1	624095	4"		641984-10	10"		624331	5"	
	Spindle Guard	1	624342	5"		641984-11	11"		624332	6"	
	Spindle Guard	1	624096	6"		641984-12	12"		624333	7"	
	Spindle Guard	1				641984PT	13"				
	Spindle Guard										
	Fluid Inducer										

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158/15 Right Angle Drill Head - Gearing

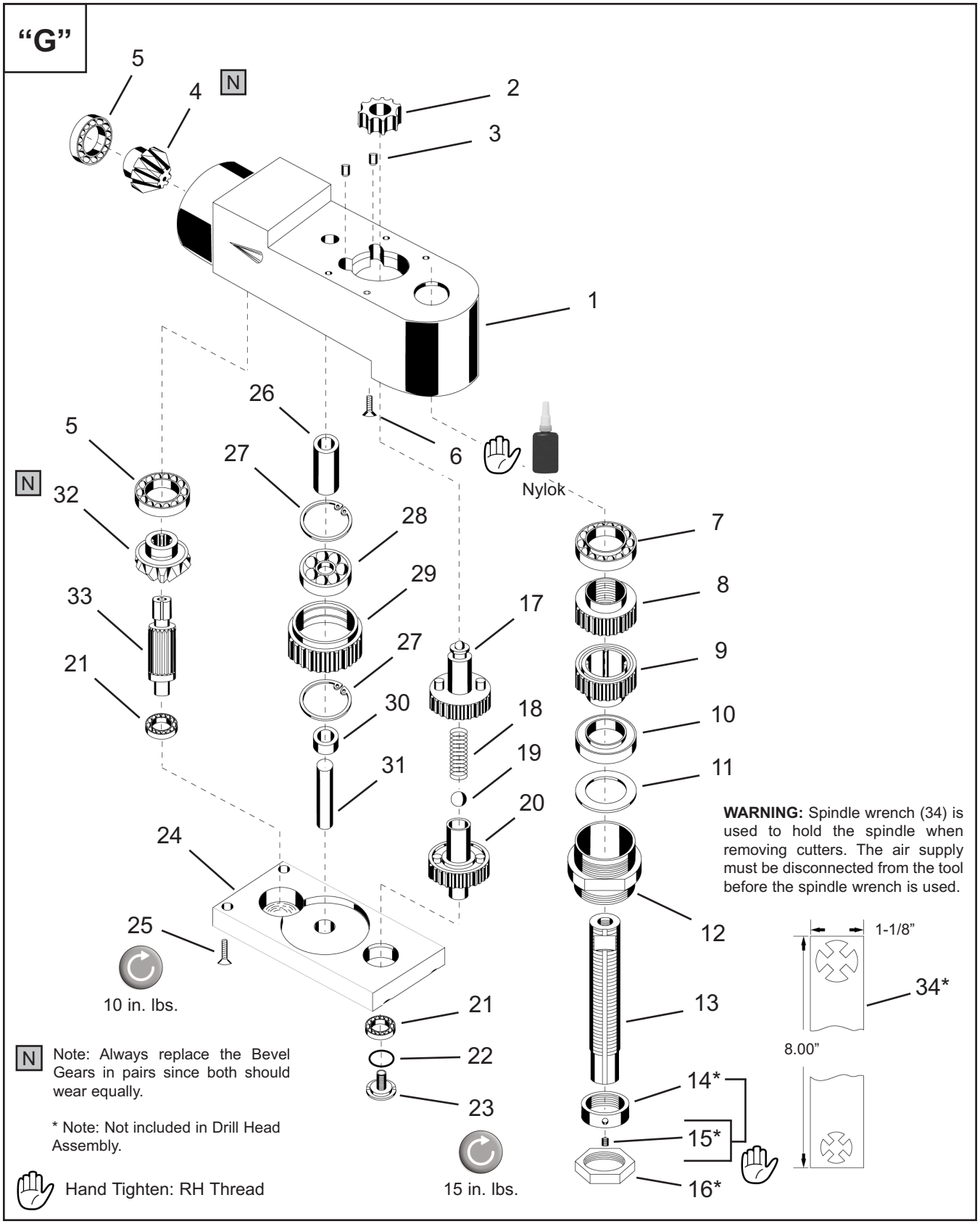

Illustration "G" - Right Angle Drill Head - Gearing (158/15 series)

Ref	Number	#	X	EN Description
--	Table "G"	1		Drill Head Assembly
1	Illustration "F"	1		Housing
2	622985	1		Gear Stop
3	622984	2	4	Clutch Roller
4	622947	1	1	Bevel Gear (Driving)
5	847095	2	4	Ball Bearing
6	863463	1	3	Screw (6-32 UNC)
7	617168	1	2	Ball Bearing
8	Table "G1"	1	1	Spindle Feed Gear
9	622950	1	1	Spindle Drive Gear
10	622400	1	2	Ball Bearing
11	865576	1		Thrust Race
12	622401	1		Nose Adapter
13	Table "G2"	1		Spindle
14	617962	1		Stop Collar
15	617785	1	2	Set Screw (8-32 UNC)
16	629545	1		Jam Nut (Optional)
17	Table "G3"	1	1	Differential Feed Gear
18	617993	1	3	Spring
19	842161	1	3	Steel Ball (3/16")
20	622949	1	1	Differential Drive Gear
21	847609	1	2	Ball Bearing (Pinion Shaft)
22	844306	1	3	O-Ring
23	622976	1	1	Drive Gear Retainer Screw (8-32 UNC)
24	625092	1		Cover
25	617166	2	4	Screw (6-32 UNC)
26	614574	1		Idler Gear Spacer (Long)
27	619016	2	2	Retaining Ring
28	617980	1	2	Ball Bearing
29	622948	1	1	Idler Gear
30	614575	1		Idler Gear Spacer (Short)
31	622980	1		Idler Gear Shaft
32	622946	1	1	Bevel Gear (Driven)
33	622952	1	1	Pinion and Shaft
34	622466	1		Spindle Wrench

(#) Quantity
(X) Recommended Spare Parts

Table "G"

Ref.	Description	#	Part Number	Feed Rate
--	Drill Head Assembly	1	631778	.001
--	Drill Head Assembly	1	631780	.002

Table "G1" - Spindle Feed Gear

Ref.	Description	#	Part Number	Feed per Revolution	Number of Teeth
8	Spindle Feed Gear	1	623002	.001	43
	Spindle Feed Gear	1	622943	.002	40

Table "G2" - Spindles

Ref.	Description	#	Part Number	Overall Length	Solid or Fluid	Attachment Thread
13	Spindle	1	615915	4.00"	Fluid	3/8"-24
	Spindle	1	624083	5.00"	Fluid	1/4"-28
	Spindle	1	623812	6.00"	Fluid	3/8"-24
	Spindle	1	623284	9.00"	Fluid	5/16"-24
	Spindle	1	627467	10.00"	Fluid	9/16"-18

Note: Other spindles avilable on request.

Table "G3" - Differential Feed Gear

Ref.	Description	#	Part Number	Feed per Revolution	Number of Teeth
17	Differential Feed Gear	1	623003	.001	40
	Differential Feed Gear	1	622945	.002	38

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